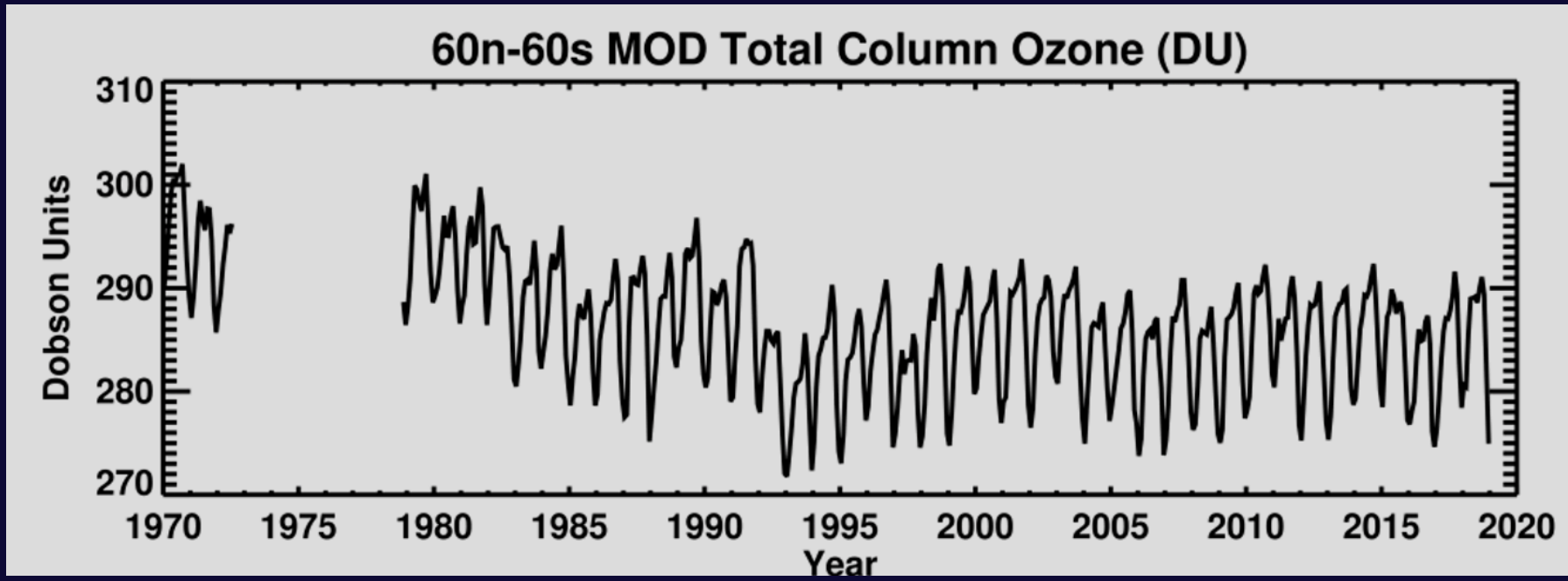
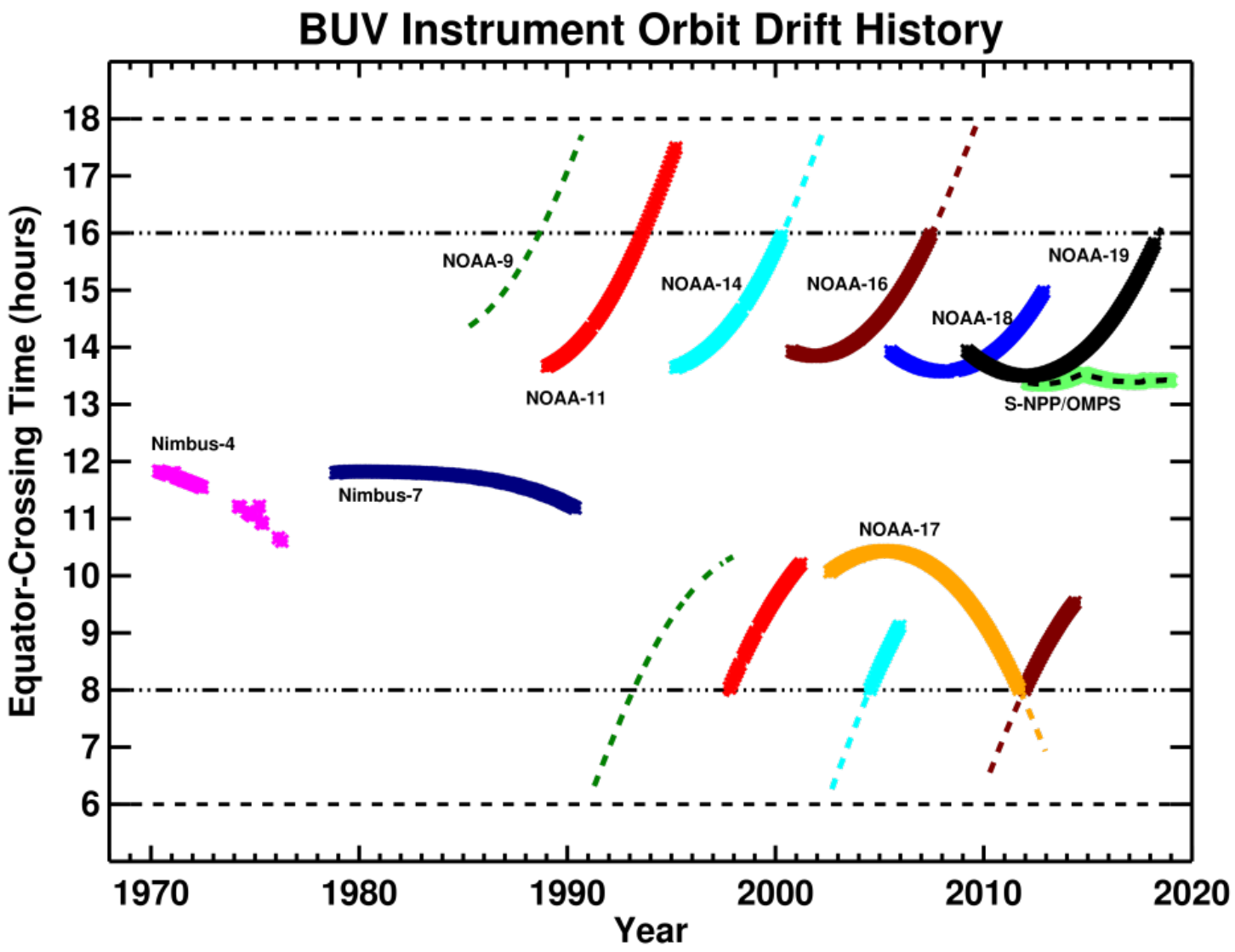
Using Aura MLS Data to Reinterpret Nearly Half Century of Ozone Record from the Nadir UV Instruments

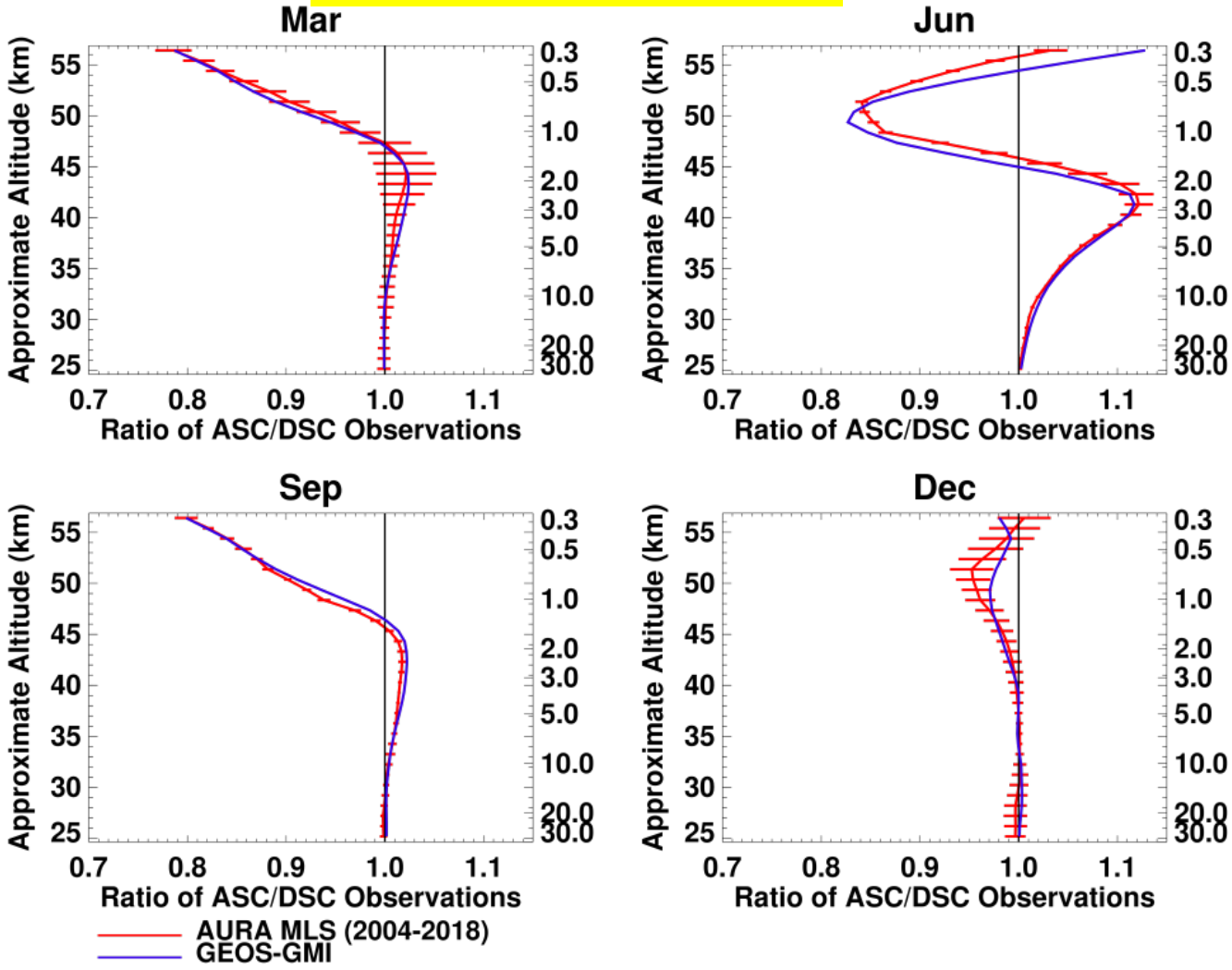


P. K. Bhartia, N. Kramarova, S. Frith, J. Ziemke, G. Labow, and R. D. McPeters, NASA GSFC


BUV Instrument Orbit Drift History
Equator-Crossing Time (hours)
18
17
16
15
14
13
12
11
10
9
8
7
6
1970
1980
1990
2000
2010
2020
Year
NOAA-9
NOAA-11
NOAA-14
NOAA-16
NOAA-18
NOAA-19
S-NPP/OMPS
Nimbus-4
Nimbus-7
NOAA-17

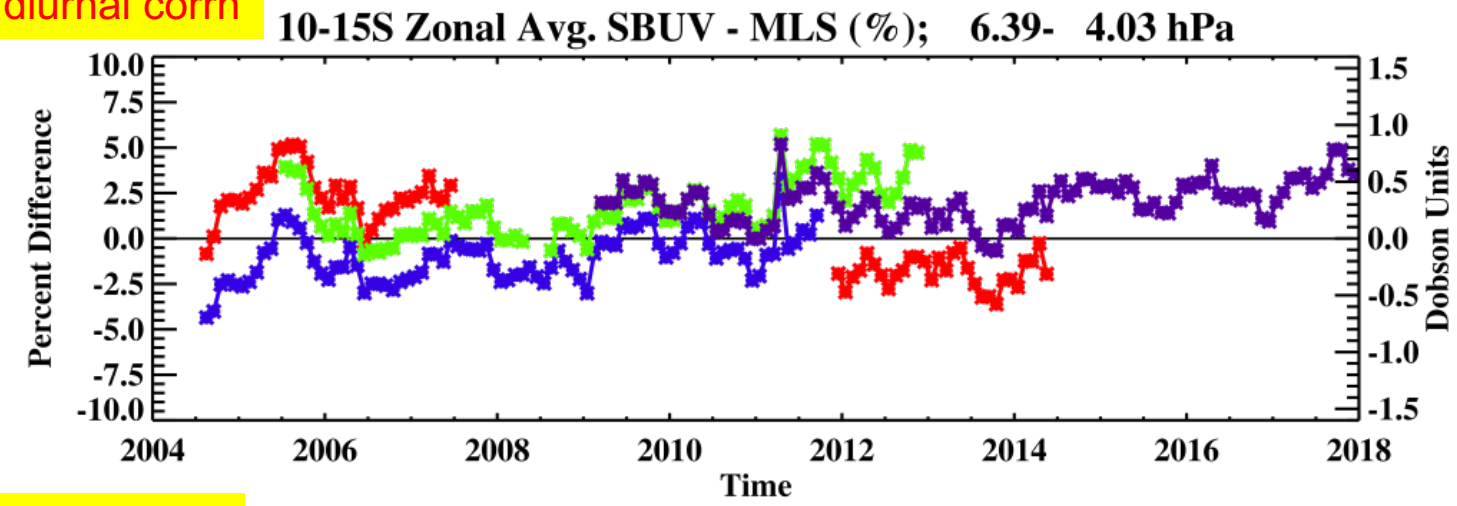
Day/Night Ratio of O_3 at 65-70N

MLS Red GMI Blue

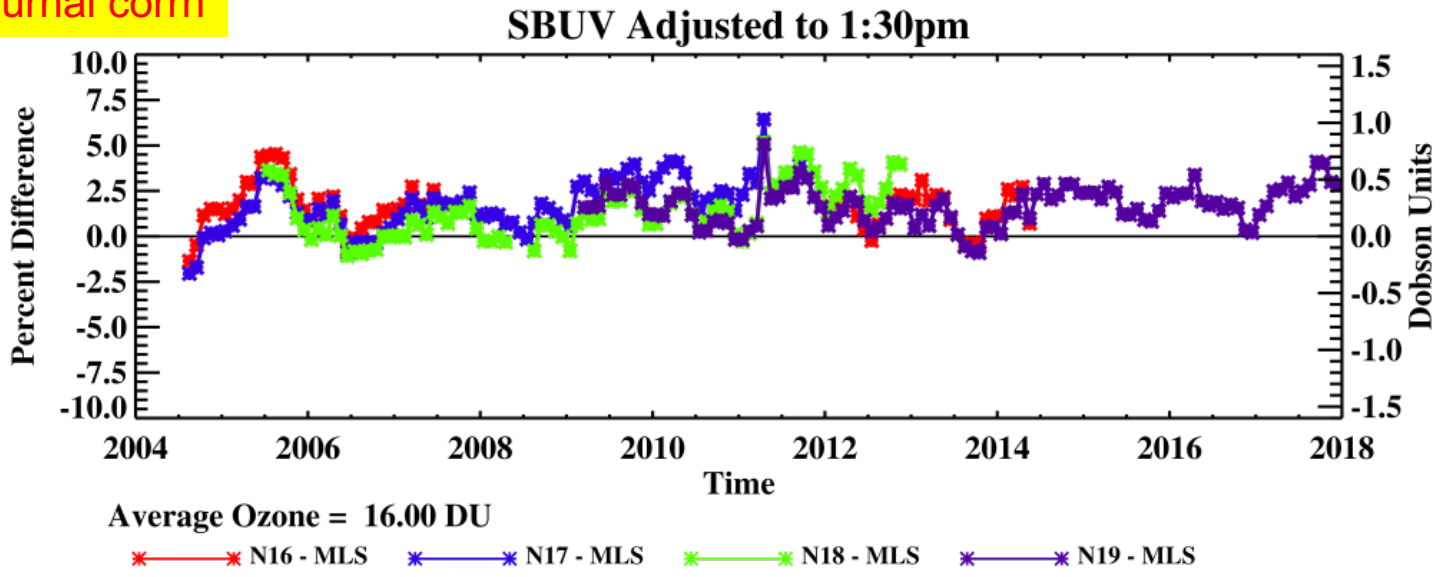


SBUV-MLS With and Without Diurnal Correction

w/o diurnal corrn

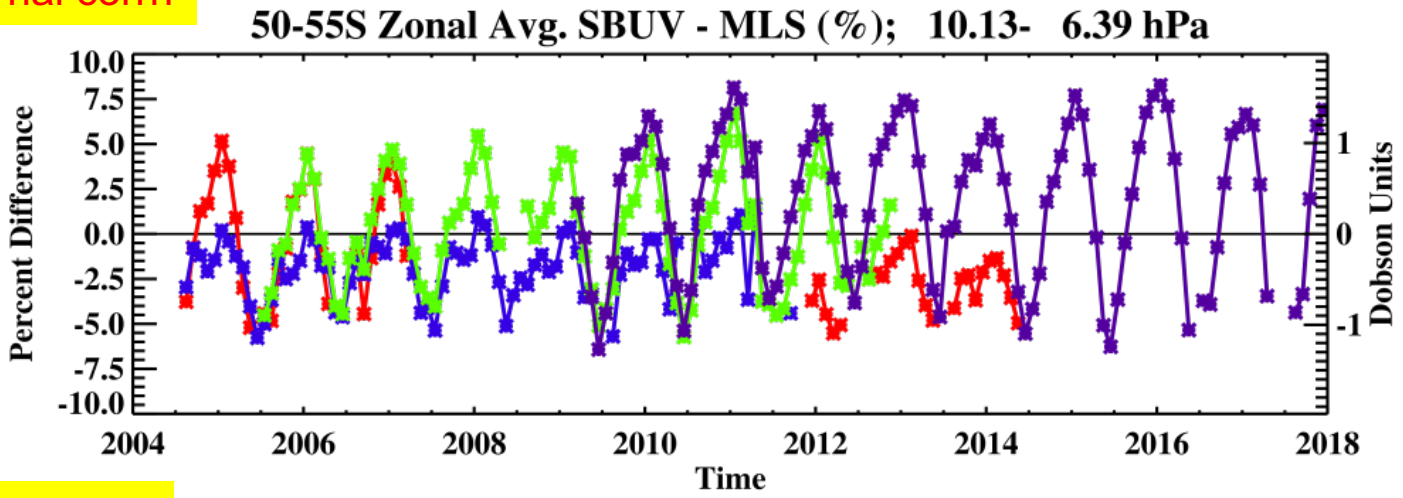


with diurnal corrn

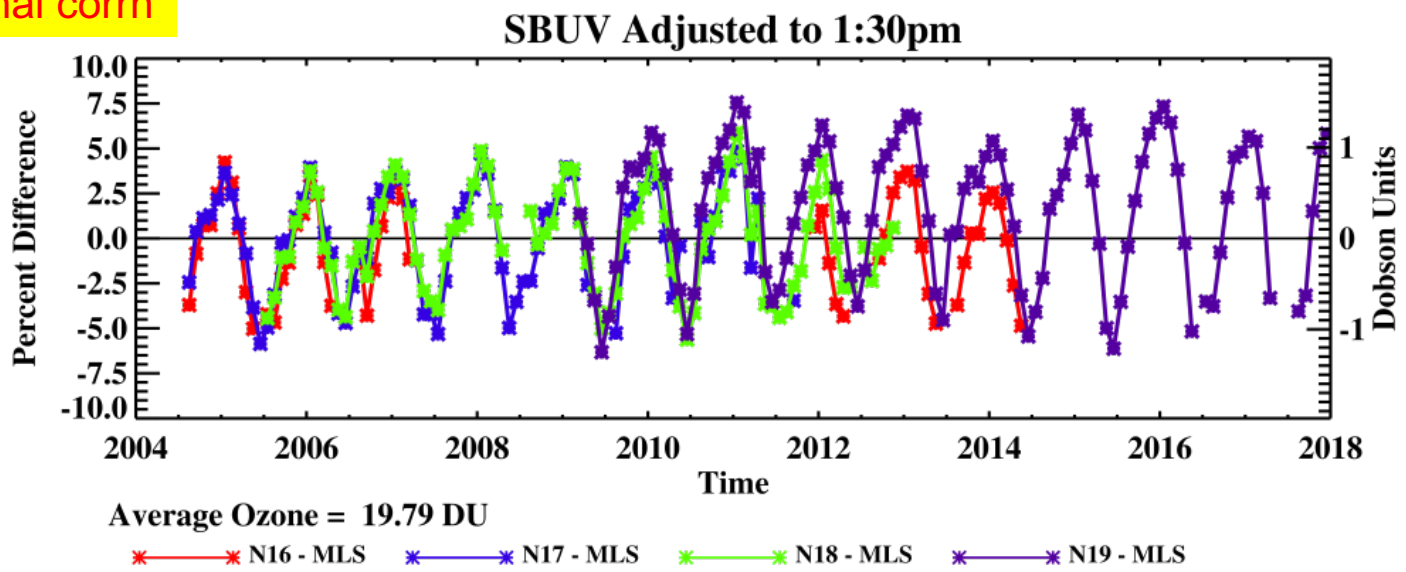


SBUV-MLS With and Without Diurnal Correction

w/o diurnal corrn



with diurnal corrn



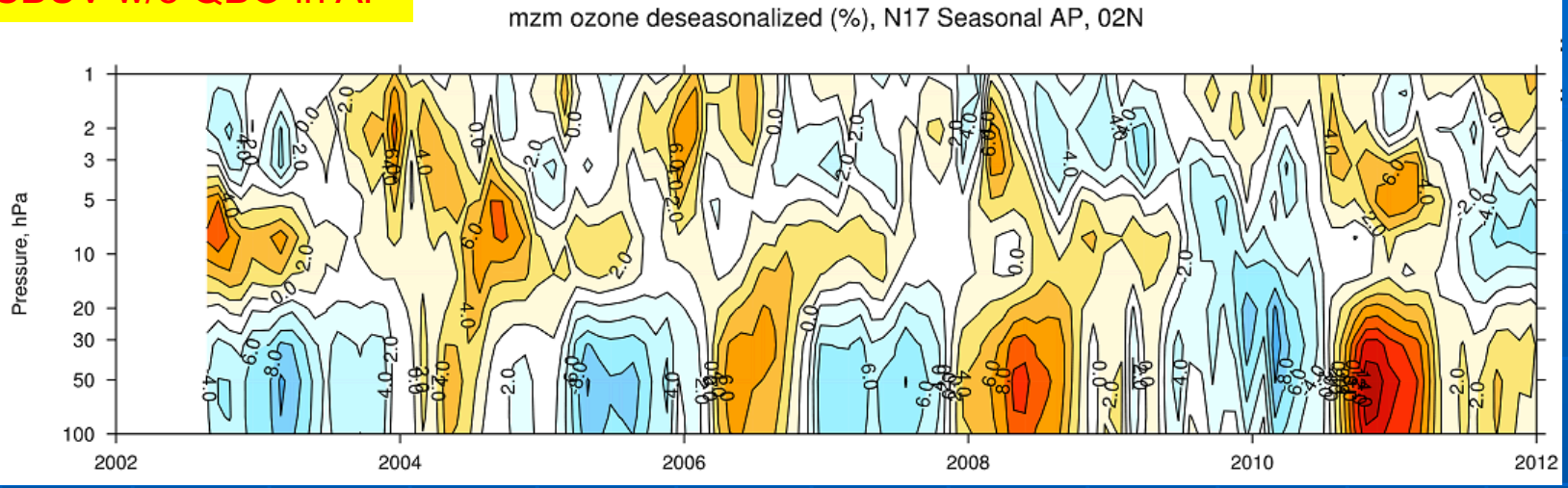
Role of A Priori in Reducing Smoothing Error in Remotely-Sensed Data

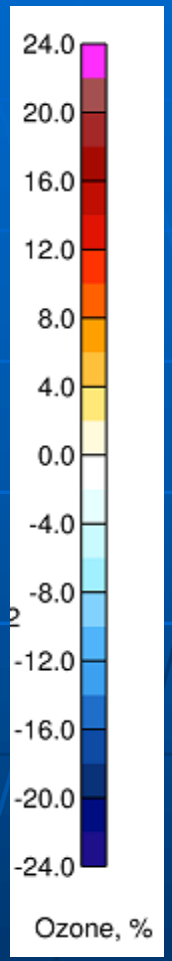
$$E(X) = \underbrace{(I-A)}_{\text{High Pass Filter}}(X-X_{ap})$$

High vertical resolution features that are common to both X and X_{ap} do not produce any error

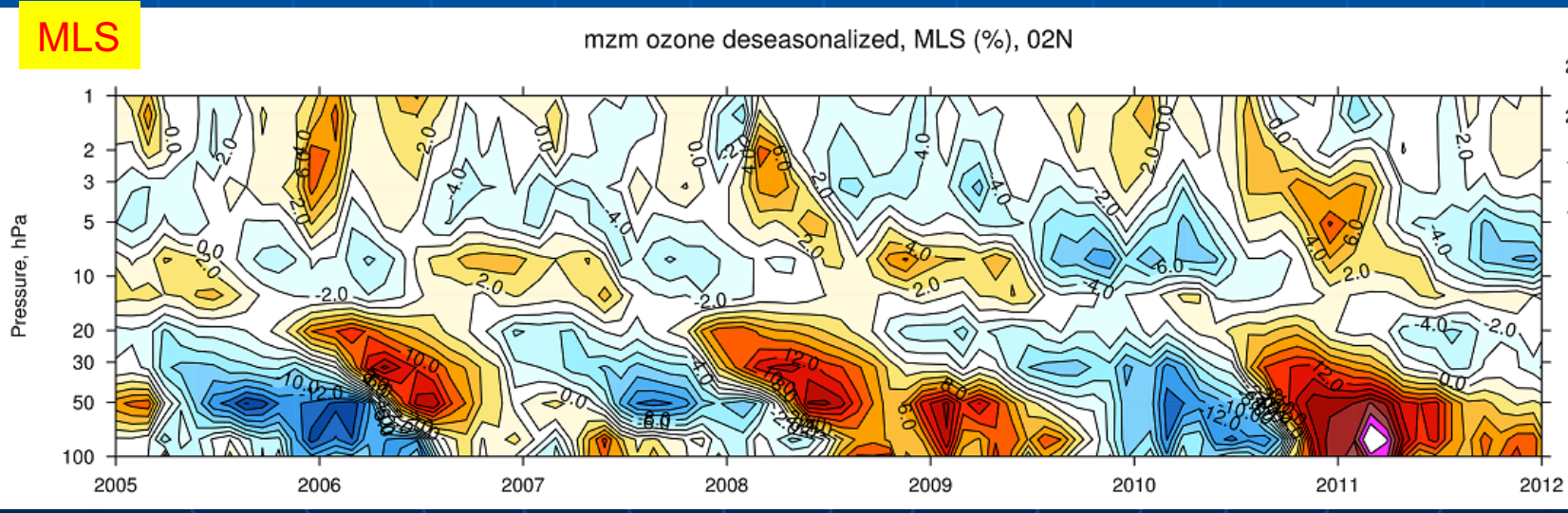
SBUV Without QBO in AP VS MLS

SBUV w/o QBO in AP

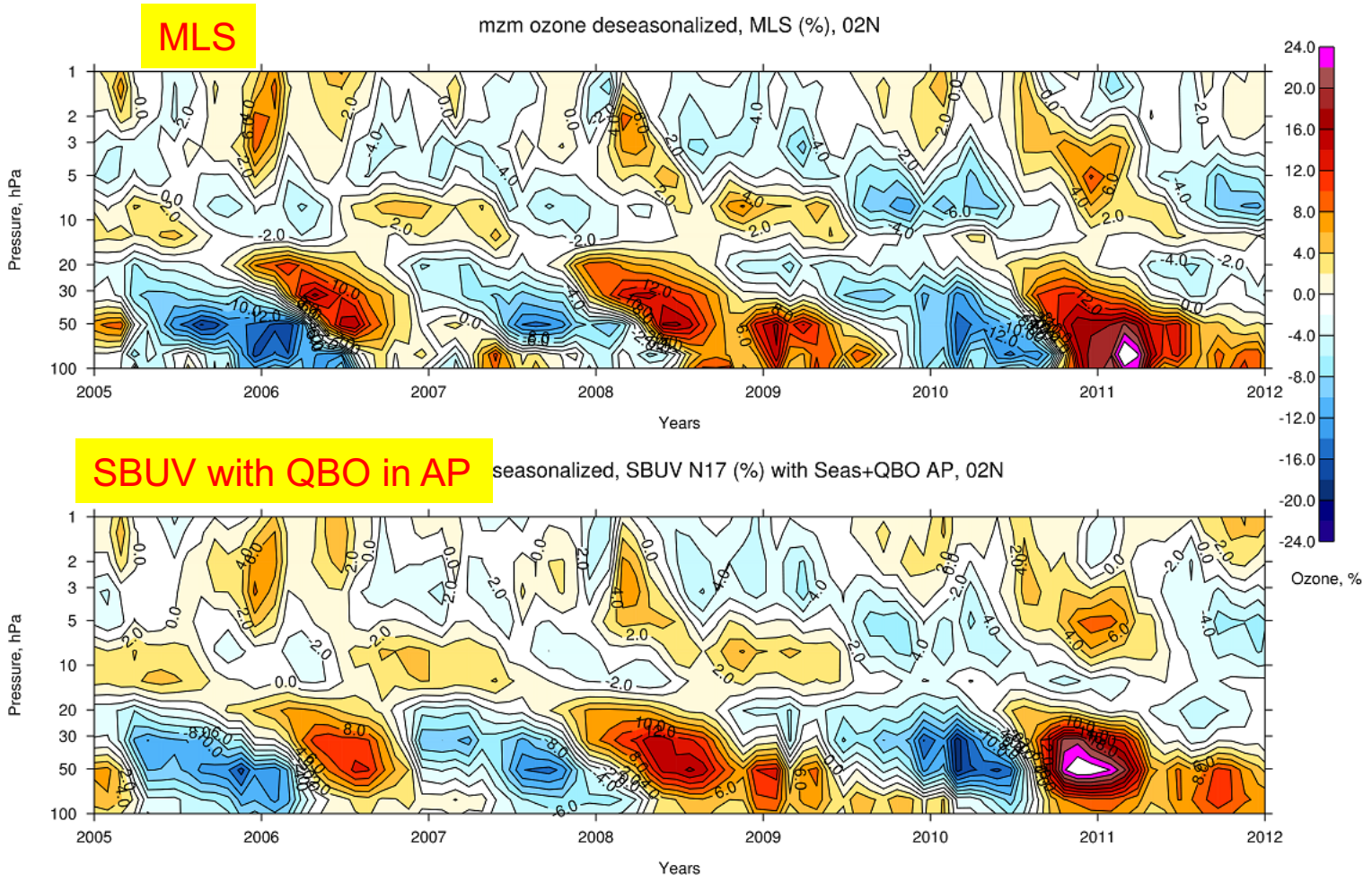




MLS



SBUV With QBO in AP VS MLS



Summary

- MLS has helped validate O_3 diurnal variation model needed to interpret SBUV/2 data from drifting NOAA satellites.
- MLS-derived climatology with QBO has greatly reduced smoothing errors in the SBUV data.
- SBUV data have in turn revealed some anomalies in the MLS+Sonde climatology that is currently under investigation.